

2017 Field Study to Update Alberta Upstream Oil and Gas Equipment, Component & Fugitive Factors



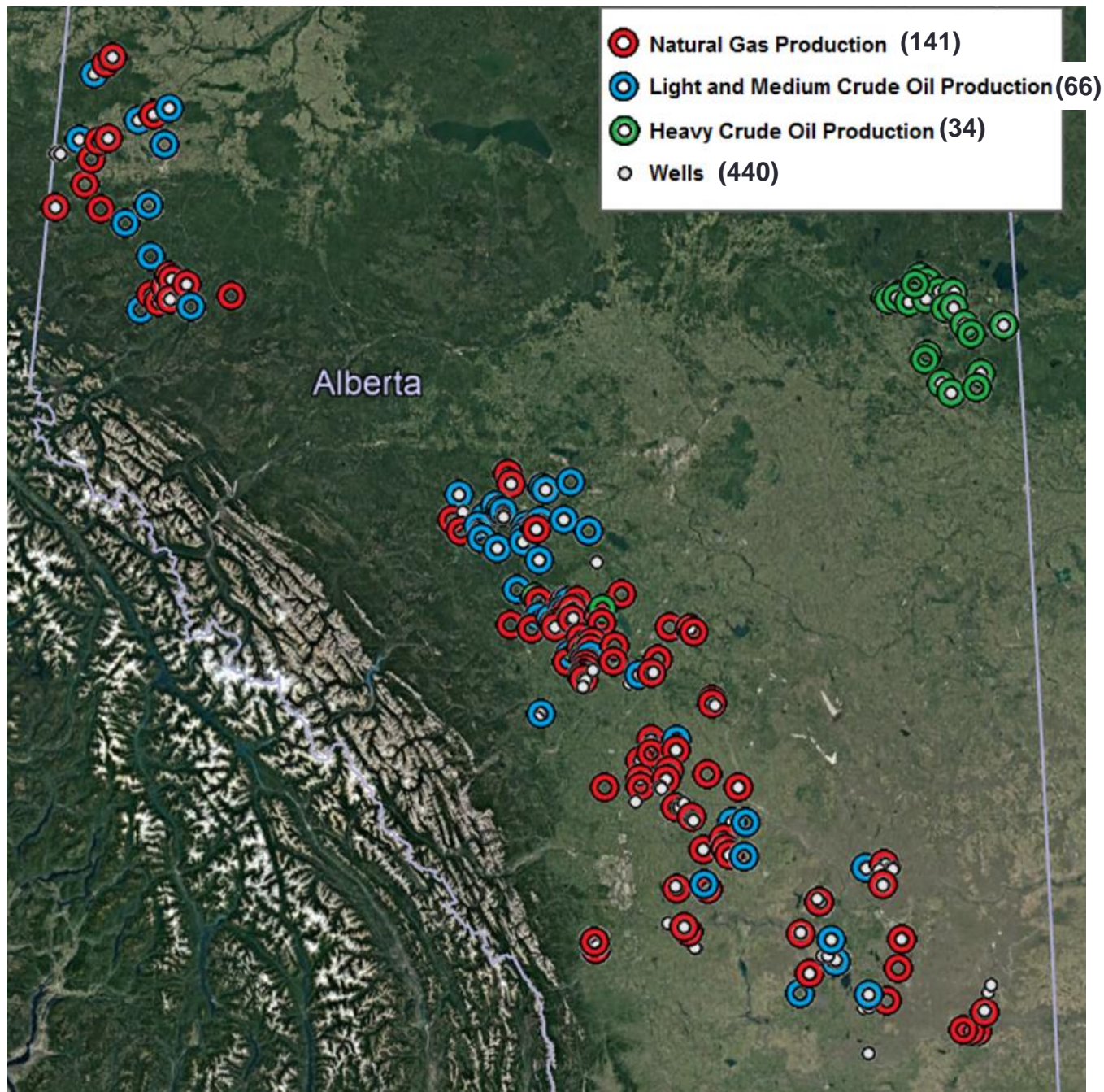
Presented by: Yori Jamin

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2017 Alberta Field Study

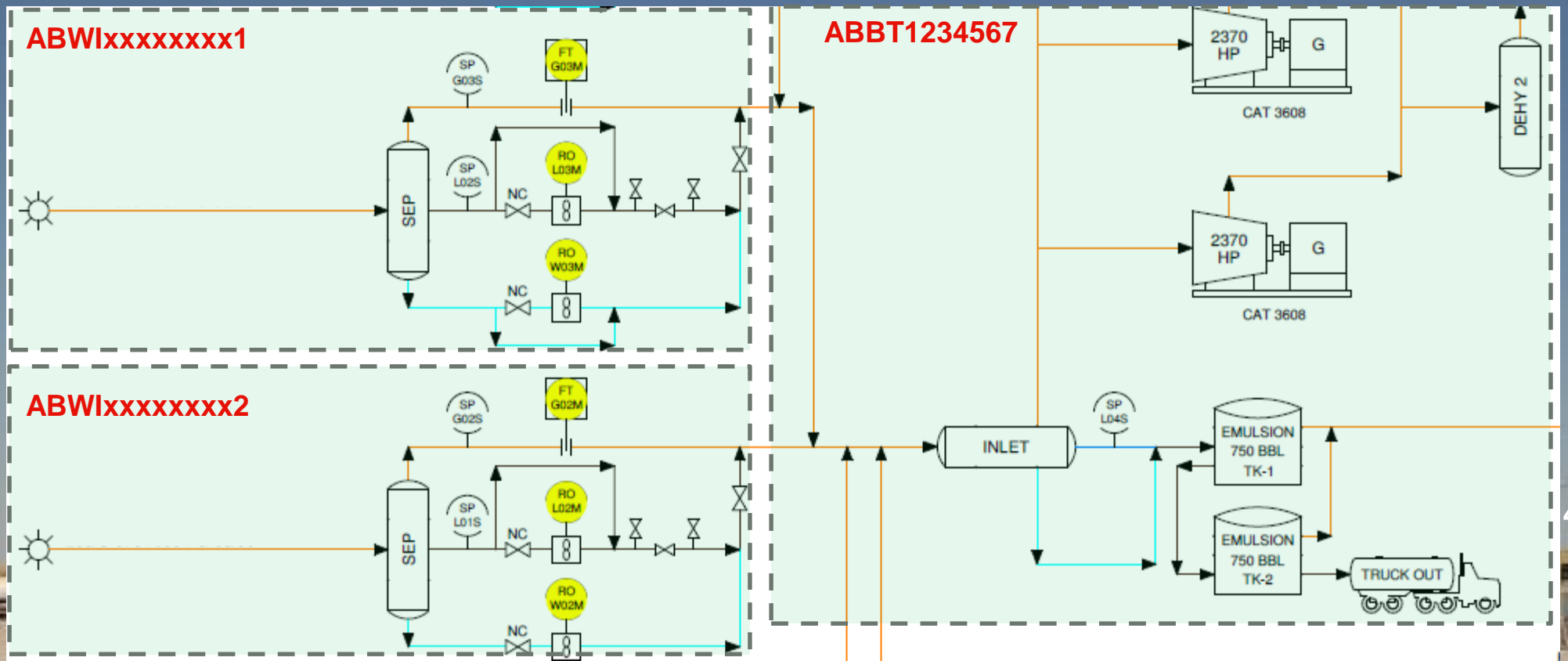
- ▶ Funded by NRCan and authorized by AER.
- ▶ Improve confidence in methane emission inventory:
 - ▶ Field counts of process equipment, components and pneumatic devices.
 - ▶ Update leak factors.
- ▶ Focused on sites and sources contributing the most to methane emission uncertainty (in 2011 Upstream Oil & Gas National Inventory).
 - ▶ Wells, batteries and compressor stations.
- ▶ Conducted at 333 randomly selected locations operated by 63 different companies.







2017 Alberta Field Study

- ▶ Snap-shot in time representing the vintage, production characteristics and regulatory oversight in Alberta during 2017.
- ▶ Facilities and wells correlated with active Petrinex identifiers (using measurement schematics) to align results with a regulated data model.

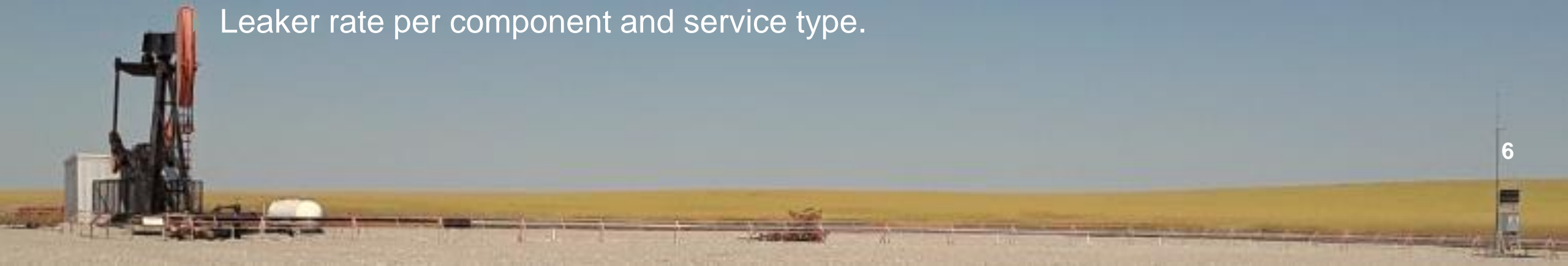


Data Collection & Analysis

- ▶ Sampling plan with clear definitions (leak vs vent, OEL vs PRV, etc) and standardized data collection methods.
- ▶ Field counts and OGI leak surveys led by  GREENPATH ENERGY LTD
- ▶ Three days of desktop and on-site training with extensive QAQC activities.
- ▶ Factors and confidence intervals determined by  Carleton UNIVERSITY using the Bootstrapping Method.
 - ▶ Considered uncertainty arising from inaccuracy in measuring devices, repeatability of counts, OGI method effectiveness and random variation in quantities measured.

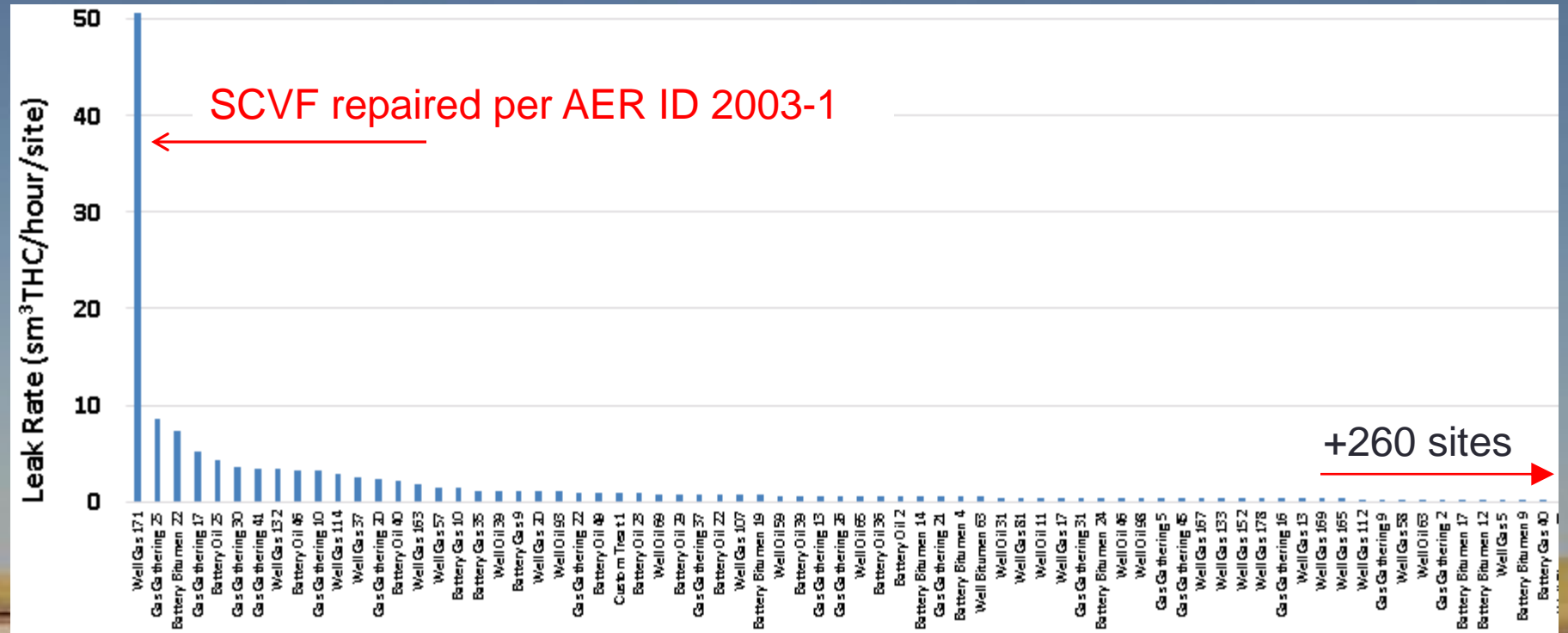
Equipment, Component and Emission Factors

- ▶ End use:
 - ▶ AER D060 regulatory impact assessment.
 - ▶ National Emission Inventory for Upstream Oil and Gas.
- ▶ Final report has 6 types of factors to characterize key methane sources:
 - ▶ Process equipment count per facility subtype or well status code .
 - ▶ Component count per process equipment unit .
 - ▶ Emission control type per process equipment unit.
 - ▶ Pneumatic device count per facility subtype or well status code by device & driver types.
 - ▶ Population average leak rate per component and service type.
 - ▶ Leaker rate per component and service type.



Fugitive Emission Results

- ▶ Highly skewed leak distribution:
 - ▶ Top 10 sites emit ~65% of total leak rate.
 - ▶ Similar skewed distributions observed by other researchers.
 - ▶ Single largest leak (SCVF) emits ~35% of total leak rate.



Are Fugitive Emissions Increasing or Decreasing?

- ▶ Comparison with 2005 and 2014 CAPP Leak Factor Publications:
 - ▶ Multiply 2017, 2014 and 2005 population average leak factors by ~216,000 components counted in 2017.

**2017 and 2014 equipment leaks about the same and
~60% less than 2005 emissions.**

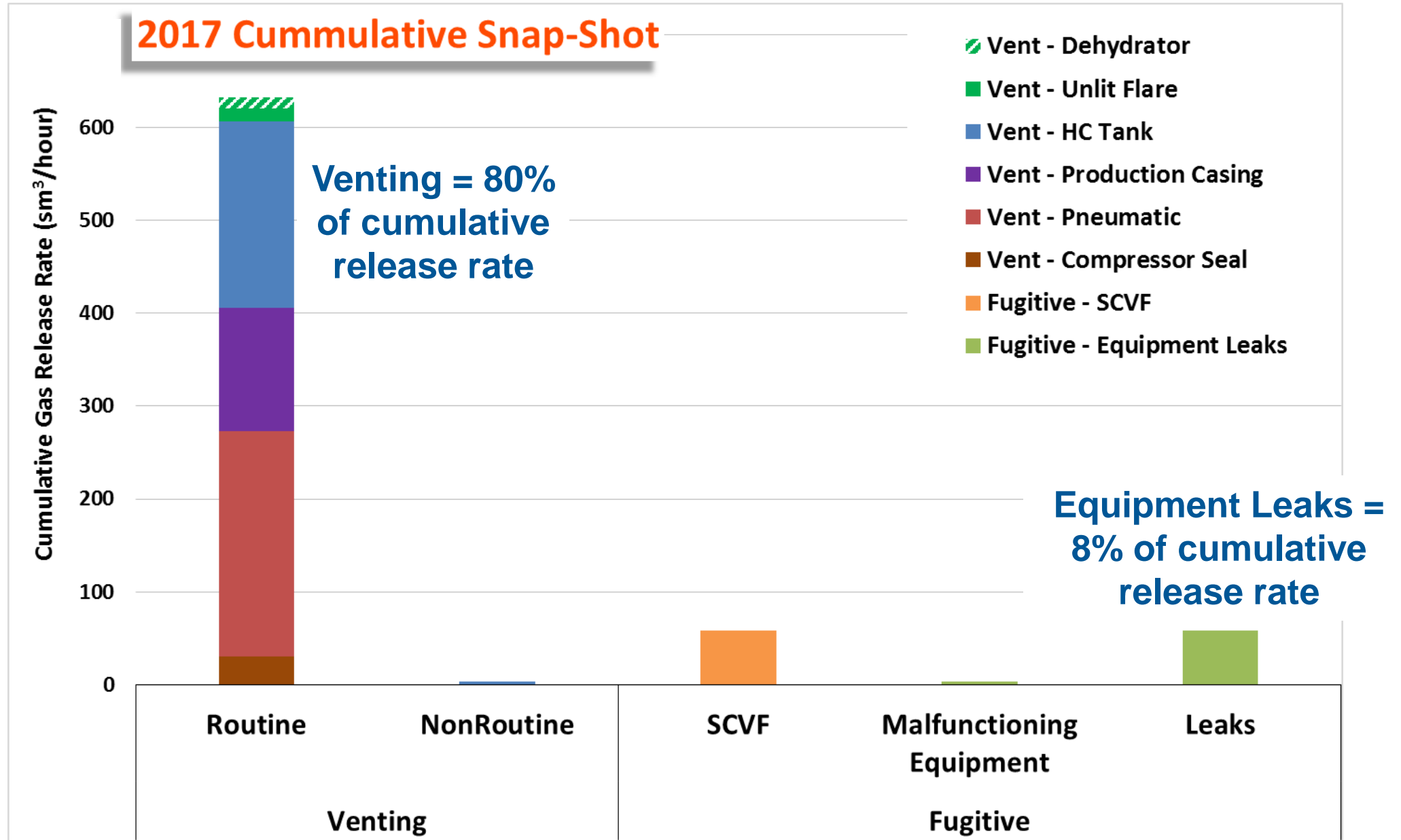


Importance of Fugitive Emissions versus Venting

- ▶ Venting estimated using emission factors (pneumatics & dehydrators) and OGI videos (tanks and unlit flares).
 - ▶ Basis for **qualitative** comparisons.
 - ▶ Large uncertainty acknowledged.
- ▶ Classify emission sources according to AER D060 categories

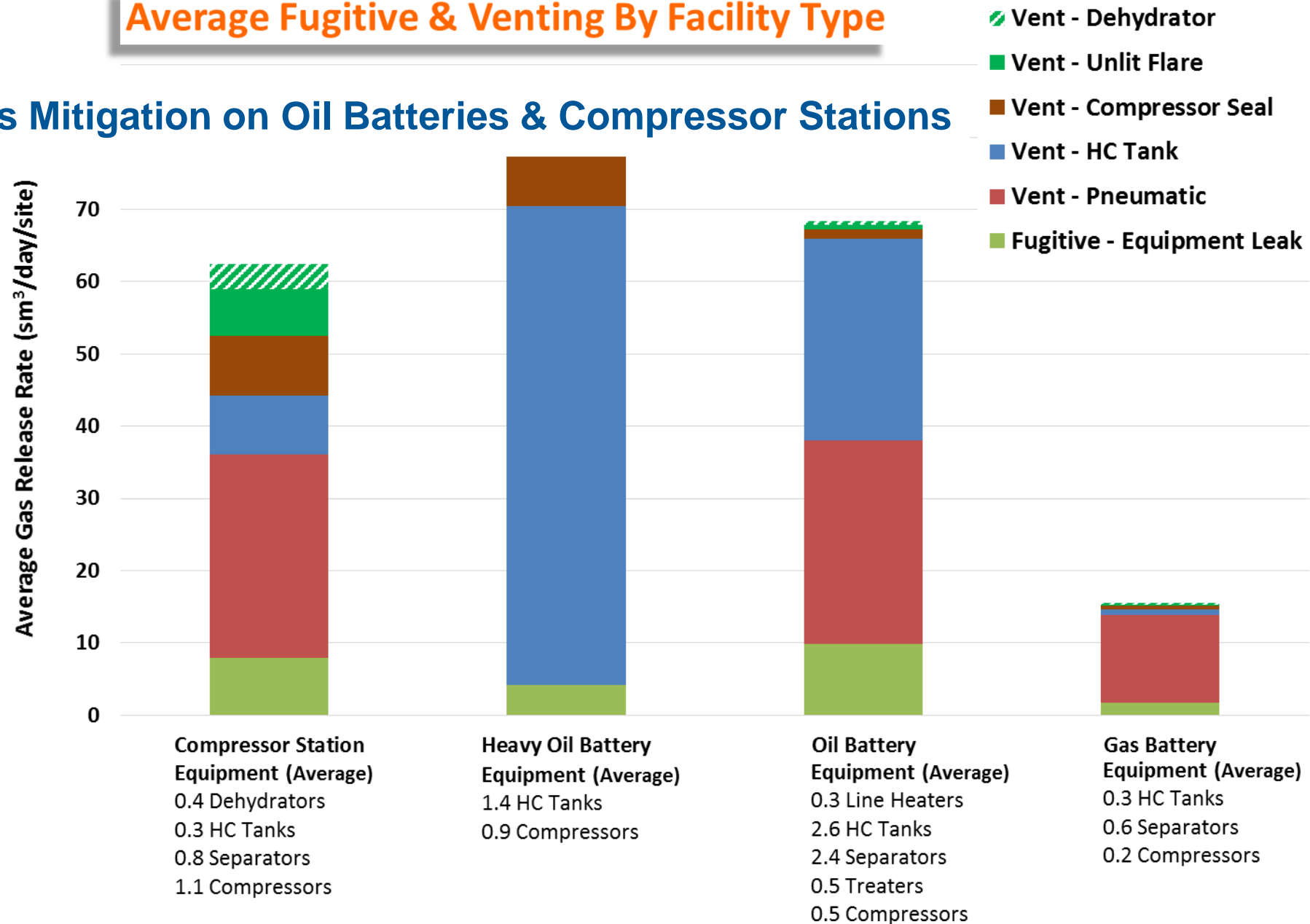


2017 Cumulative Snap-Shot

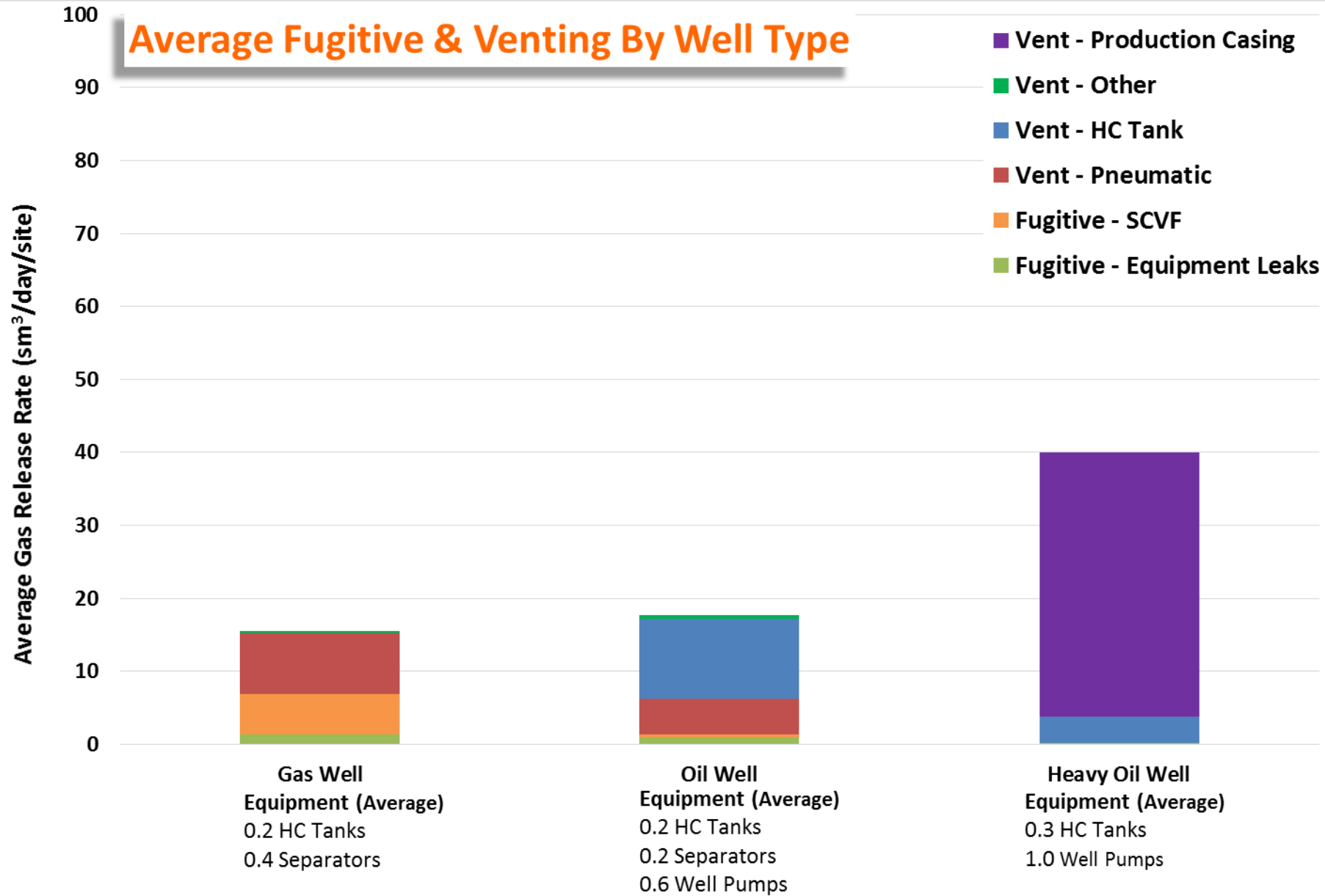


Average Fugitive & Venting By Facility Type

Focus Mitigation on Oil Batteries & Compressor Stations



Average Fugitive & Venting By Well Type



Thank you



Natural Resources
Canada

Ressources naturelles
Canada

Canada



**Alberta
Energy
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Full Report:

<https://www.aer.ca/providing-information/by-topic/methane/reports-and-studies>

